

THYONE TANYSPEIRA, A NEW SPECIES OF SEA CUCUMBER FROM THE SOUTHERN CARIBBEAN SEA (ECHINODERMATA: HOLOTHUROIDEA)

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ABSTRACT

A new species of *Thyone* s.s. is described from 51-170 meters depth off Honduras, Colombia and Trinidad. Distinctive features include: presence of rosettes alone in the introvert; body wall ossicles with greatly reduced spires; and tube foot ossicles with greatly elongated spires. A key is provided to the six western Atlantic species of *Thyone*.

Through the courtesy of Dr. G. L. Voss of the University of Miami, we received for study a collection of holothurians from the western Atlantic. Among the R/V PILLSBURY collections we found several specimens of a new species of the genus *Thyone* s.s.; the new species is described below. Pawson and Miller (1981) described two new western Atlantic species of *Thyone* and summarized the status of the 14 species formerly assigned to the genus (mostly by Deichmann, 1930) in this region. They presented a key to the five western Atlantic species of *Thyone*; a modified version of the key is provided here.

Order Dendrochirotida Grube, 1840
Family Phyllophoridae Oestergren, 1907
Thyone Jaeger, 1833

Diagnosis.—Tentacles 10. Tube feet scattered on body wall, never restricted to ambulacral radii. Calcareous ring with long posterior projections, each made up of several pieces of calcite. Body wall ossicles tables with a spire of two pillars. Introvert may contain rosettes only, tables only, or tables and rosettes. (After Pawson and Miller, 1981).

Type Species.—*Holothuria fusus* Muller, 1776, by original designation of Jaeger, 1833.

Remarks.—*Thyone* is a polyphletic genus which includes more than 40 species. Panning (1949), Deichmann (1954, 1957, 1963), Madsen (1941) and others have attempted to revise parts of the genus, but much work remains to be done. For more information see Pawson and Miller (1981).

KEY TO WESTERN ATLANTIC SPECIES OF *THYONE* S.S. (REVISED, AFTER PAWSON AND MILLER, 1981, P. 394)

- 1a. Body wall tables with oval disks, 4 perforations and thick margins 2
- 1b. Body wall tables mostly irregular in outline, perforations few to numerous, margin thin 4
- 2a. Spires of body wall tables terminate in several short teeth 3
- 2b. Spires of body wall tables terminate in single blunt spines
..... *Thyone crassidisca* Pawson and Miller, 1981
- 3a. Body wall tables with low, truncate spires. Introvert with tables and rosettes
..... *Thyone pseudofusus* Deichmann, 1930
- 3b. Body wall tables with high tapering spires. Introvert with rosettes only
..... *Thyone adinopoda* Pawson and Miller, 1981
- 4a. Body wall tables with 4-9 perforations. Spires of supporting tables in tube feet abruptly tapering. Introvert with tables; rosettes absent *Thyone pawsoni* Tommasi, 1972

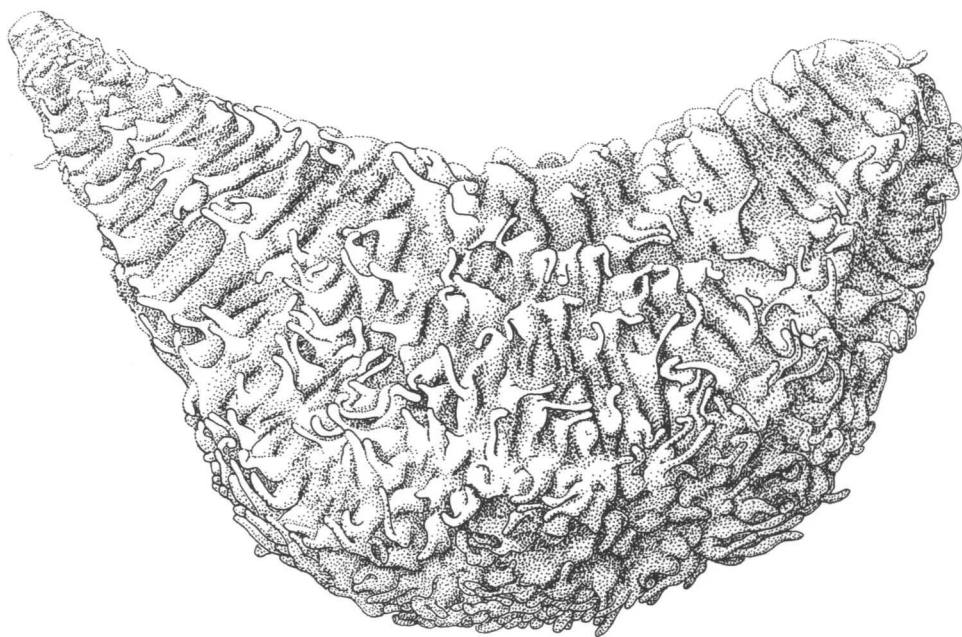


Figure 1. *Thyone tanyspeira* new species, Holotype, right lateral view; TL = 22 mm.

- 4b. Body wall tables usually with 8 or more perforations. Spires of tables in tube feet gently tapering. Introvert with rosettes; tables present or absent 5
- 5a. Introvert with rosettes only. Spires of body wall tables greatly reduced; spires of tables from tube feet greatly elongated *Thyone tanyspeira* new species
- 5b. Introvert with rosettes and tables. Spires of body wall tables low but well formed; spires of tables from tube feet not greatly elongated *Thyone inermis* (Heller, 1868)

***Thyone tanyspeira* new species**
Figures 1–4

Diagnosis.—Body crescent- or U-shaped, up to 26 mm total length (TL); tube feet long, hair-like. Ventral pair of tentacles smaller than others. Body wall ossicles exclusively tables with numerous perforations and reduced spires; supporting tables of tube feet with enormous spires up to 111 μ m in height; tentacles with rods; introvert with rosettes only.

Material Examined.—The type material comprises 37 specimens, of which only 6 are complete; the remainder have partly or completely autotomized the calcareous ring and related structures. The types have been deposited, as indicated below, in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), the Indian River Coastal Zone Museum, Harbor Branch Oceanographic Institution, Fort Pierce, Florida (IRCZM), and the Rosenstiel School of Marine and Atmospheric Science, University of Miami, Florida (UMML).

Holotype.—USNM E34405, male, 22 mm TL, R/V PILLSBURY Cr. 6907, Station 837, 30 June 1969, southeast of Trinidad, 10°09.8'N, 60°34.3'W to 10°10.3'N, 60°33.2'W, 55 m, 10 foot otter trawl.

Paratypes.—USNM E34406, 24 specimens (7 males, 17 females), 11–26 mm TL, same locality data as Holotype. IRCZM 71:402, 3 specimens (2 males, 1 female), 16–22 mm TL, same locality data as Holotype. UMML 43211, 3 specimens (2 males, 1 female), 19–24 mm TL, same locality data as Holotype. USNM E34407, 3 specimens (1 male, 2 females), 19–22 mm TL, R/V PILLSBURY Cr. 6806, Sta. 797, 1 August 1968, off Cartagena, Colombia, 10°21.9'N, 75°47.3'W to 10°20.2'N, 75°44.0'W, 170–150 m, 10 foot otter trawl. USNM E34408, 2 specimens (1 male, 1 female), 17–18 mm TL (strong U-shape), R/V PILLSBURY Cr. 6907, Sta. 836, 30 June 1969, southeast of Trinidad, 9°56.5'N, 60°46'W

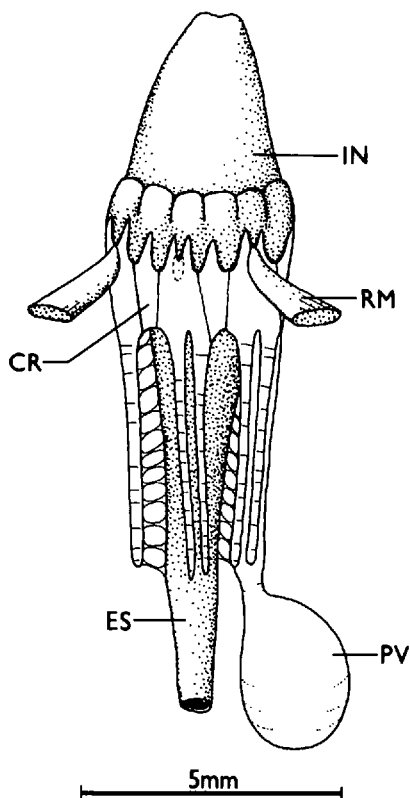


Figure 2. *Thyone tanyspeira* new species. Calcareous ring and related structures from specimen of 26 mm TL; CR, calcareous ring; ES, esophagus; IN, introvert; PV, Polian vesicle; RM, retractor muscle.

to 9°59'N, 60°46'W, 57–59 m, 10 foot otter trawl. USNM E34409, 1 specimen (female), 12 mm TL, R/V PILLSBURY Cr. 7101, Sta. 1366, 2 February 1971, 19 km north of Payabila, Honduras, 16°04'N, 84°44'W, 51 m, 10 foot otter trawl, bottom smooth sand with scattered small sponges and algae.

Description.—(based on type series) Body small, crescent- to U-shaped, total length 11–26 mm, fusiform, tapering towards terminal mouth and anus; tapering more exaggerated at posterior end (Fig. 1). Body wall thin, stiff with ossicles, coriaceous. Contracted specimens strongly wrinkled. Tube feet long (1 mm dorsally, 1.5–2.0 mm elsewhere), thin, hair-like, extremely numerous, arising from distinct basal warts composed of heavy concentrations of ossicles. Dorsal tube feet papilliform, lateral and ventral feet with suckers. In smallest specimens, feet tend to be restricted to radii; in largest specimens feet restricted to radii anteriorly and posteriorly only. Feet most numerous medially, especially along and between radii of trivium.

Tentacles 10, ventral pair smallest, all retracted within introvert. Larger tentacles composed of central stalk (2.4 mm long) surrounded by 11–12 palps (0.8 mm long) arranged in alternating, whorled pattern. Two to four fleshy lateral lobes arise from each palp. Calcareous ring complex (Fig. 2); radials 6–7 mm long with deep notches for insertion of retractor muscles; long tails composed of several small elements. Interradials 2 mm long, with grooved anterior projection and concave posterior margin extending slightly posterior to point of union of radial

Table 1. Dimensions and perforations of body wall (bw) ossicles in *Thyone tanyspeira* n. sp. Ossicles obtained from specimens 20–26 mm TL. Measurements in μm . N = 80 except where otherwise noted. \bar{x} = mean. SD = standard deviation

Dorsal bw tables: Length 106.5–345.2; \bar{x} = 172.7; SD = 49.3. Width 58.1–174.2; \bar{x} = 82.3; SD = 19.7. Perforations 4–24; \bar{x} = 8.8; SD = 2.9.
Lateral bw tables: Length 100.0–393.6; \bar{x} = 179.6; SD = 56.0. Width 58.1–235.5; \bar{x} = 104.0; SD = 30.3. Perforations 6–45; \bar{x} = 12.6; SD = 5.7.
Ventral bw tables: Length 109.7–322.6; \bar{x} = 178.8; SD = 45.4. Width 64.5–235.5; \bar{x} = 94.8; SD = 33.1. Perforations 5–23; \bar{x} = 10.4; SD = 3.3.
Anterior bw tables: Length 101.0–303.0; \bar{x} = 151.7; SD = 38.9. Width 47.5–122.0; \bar{x} = 67.9; SD = 15.1. Perforations 5–22; \bar{x} = 11.5; SD = 3.6.
Posterior bw tables: Length 73.1–196.0; \bar{x} = 112.6; SD = 26.9. Width 36.0–82.6; \bar{x} = 55.5; SD = 11.7. Perforations 5–13; \bar{x} = 7.8; SD = 1.9.
Supporting tables from dorsal/lateral tube feet (N = 15): Disk length 83.2–110.0; \bar{x} = 97.7; SD = 8.3. Spire height 63.3–101.3; \bar{x} = 82.4; SD = 11.0.
Supporting tables from ventral tube feet (N = 15): Disk length 89.0–127.1; \bar{x} = 100.6; SD = 10.1. Spire height 56.1–111.0; \bar{x} = 78.9; SD = 15.7.

tails. Polian vesicle single, spherical; free end of stone canal short (ca. 1.5 mm), attached to dorsal mesentery near posterior end of calcareous ring, terminating at madreporite composed of two reniform ossicles ca. 400 μm long. Respiratory trees well developed, extending to anterior end of body cavity.

All 37 specimens sexually mature; sex ratio 2 females : 1 male (24 females, 13 males). In both sexes, numerous long (6–9 mm) slender unbranched gonadal tubules fill much of available coelomic space. Tubules arise from central basal zone embedded in dorsal mesentery near midpoint of body. Gonoduct coils anteriorly in dorsal mesentery opening to exterior at small, inconspicuous gonopore situated just posterior to tentacles. Mature ovarian tubules can contain 20–22 yolky oocytes of moderate size and several smaller developing eggs. Largest eggs 51–104 μm in diameter (\bar{x} = 81 μm ; N = 17) including conspicuous jelly coat 22–30 μm thick. Since females carrying large, apparently ripe oocytes were collected during February, May and August, it is likely that *T. tanyspeira* has an extended reproductive period.

Body wall ossicles (Table 1) exclusively tables with 4–45 perforations; mean number of perforations varies from 8 to 13, depending upon where ossicles occur. Tables from posterior end of body smallest, with fewest perforations; tables from mid-lateral region largest, with greatest number of perforations. Tables most densely concentrated at bases of tube feet. Disks oblong with smooth, often undulating, margins (Figs. 3A, I; 4A, L, M); spires reduced, consisting of 2 pillars meeting just above disk (Figs. 3C, F; 4B, C). Few tables have more prominent spires (Fig. 3D, E). Termini of spires bluntly rounded to acute, depending on spire length. Large, cross-shaped tables with 1–2 lateral projections occur (Figs. 3B; 4B, D). Inner surface of tables smooth (Fig. 3H), outer surface undulating, with small knob-like projections (Figs. 3C; 4B).

Tube feet contain numerous supporting tables with curved, oblong, perforated disks (Fig. 3G) and long, slender, frequently twisted spires (Fig. 4E, I, K); spires perforated or solid, up to 111 μm long, terminating in subacute or blunt tip. Spires extremely delicate, piercing epidermis in preserved material. Well-developed endplates, 100–120 μm in diameter, occur in both dorsal and ventral feet (Fig. 4O, P); raised margins give endplates a concave appearance.

Tentacles contain straight to C-shaped rods with enlarged perforated ends (Fig.

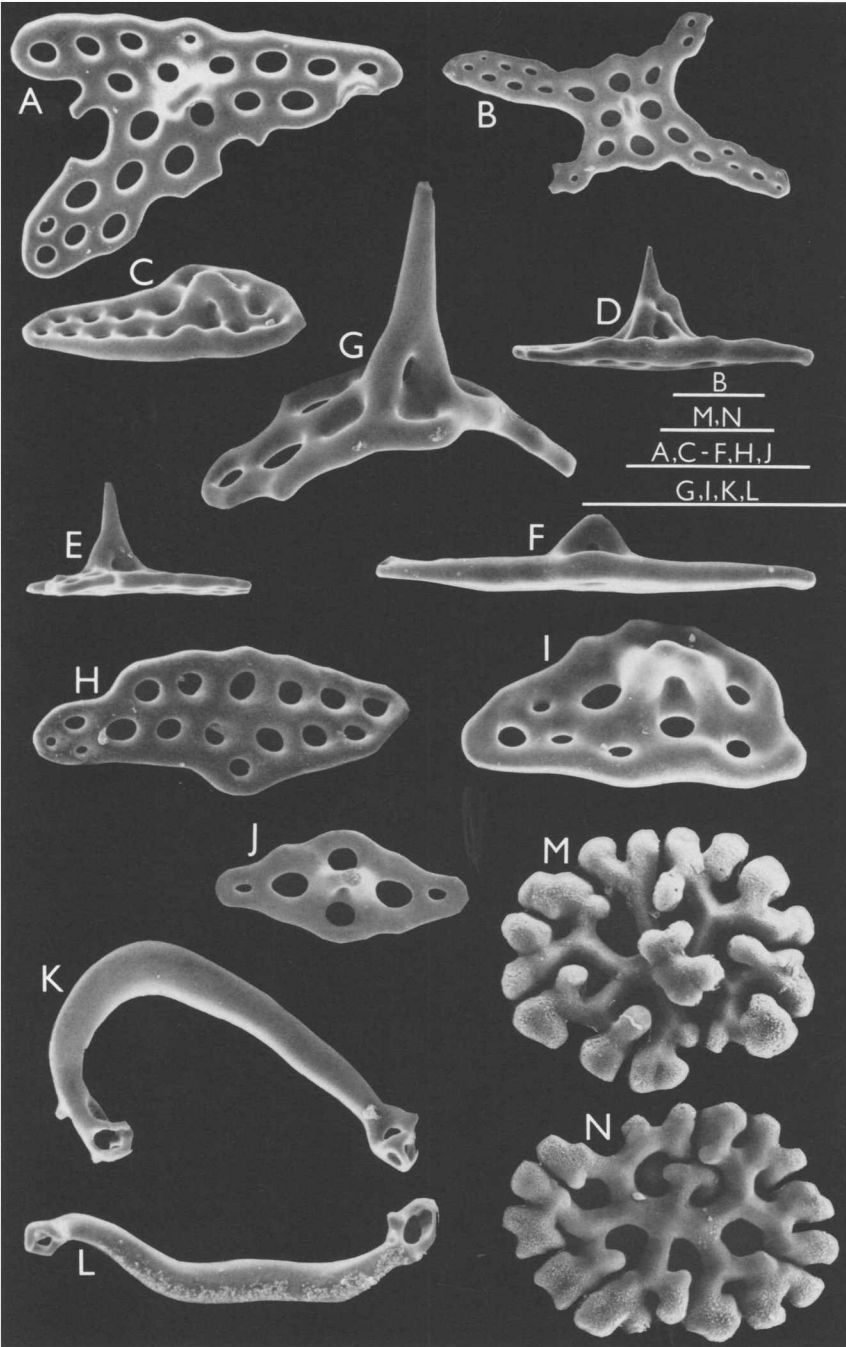


Figure 3. *Thyone tanyspeira* new species. Scanning electron micrographs of ossicles from specimens 20–26 mm TL. A–F, anterior body wall tables, showing outer (A, B, C) and lateral (D, E, F) surfaces; G, supporting table from anterior tube foot, lateral view; H–J, posterior body wall tables showing inner (H) and outer (I, J) surfaces; K, L, rods from tentacles; M, N, rosettes from introvert. Scale bars = 100 μ m.

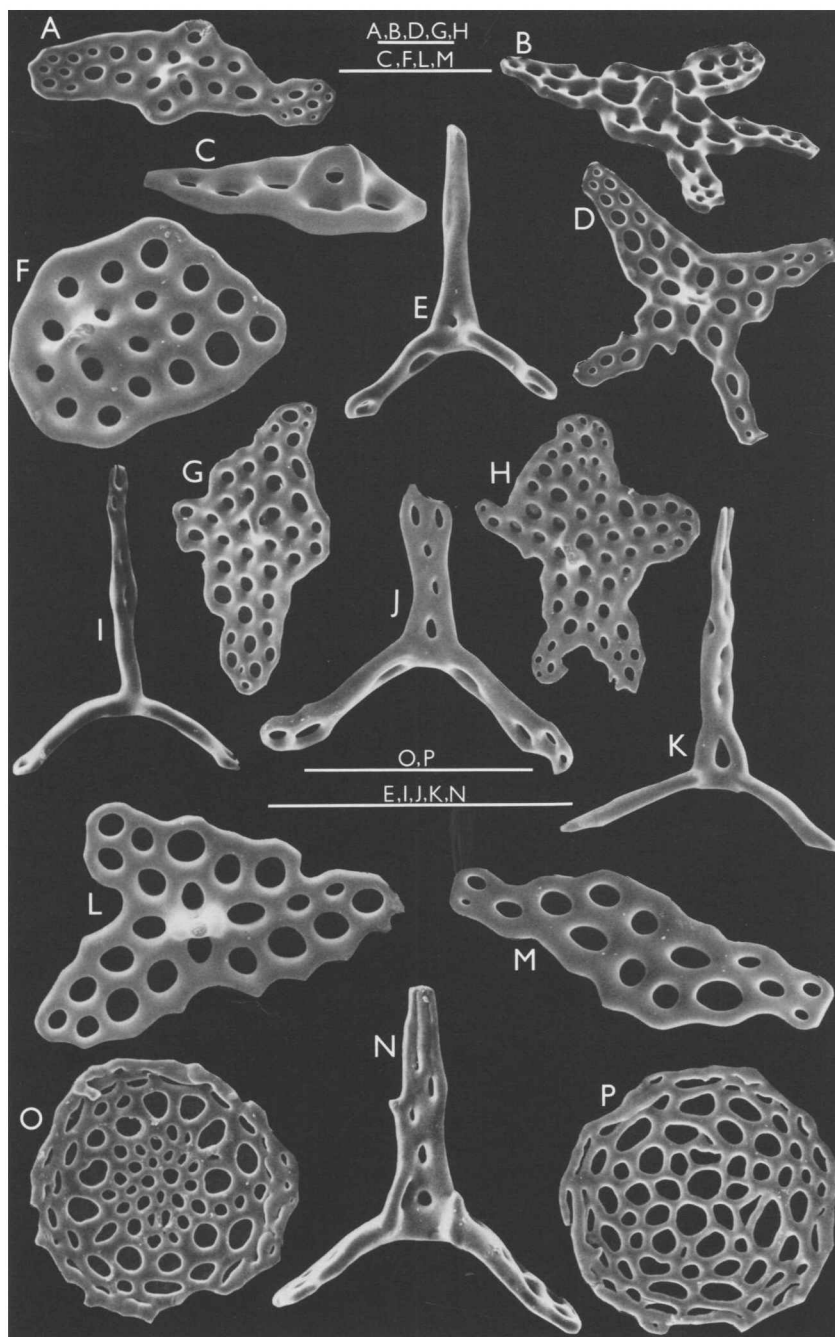


Figure 4. *Thyone tanyspeira* new species. Scanning electron micrographs of ossicles from specimens 20–26 mm TL. A–D, dorsal body wall tables, showing outer surface (B, C, oblique view); E, supporting table from dorsal tube foot, lateral view; F–H, lateral body wall tables, inner surface; I–K, supporting tables from lateral tube feet, lateral view; L, M, ventral body wall tables showing outer (L) and inner (M) surface of tables; N, supporting table from ventral tube foot, lateral view; O, P, end plates from ventral tube feet. Scale bars = 100 μ m.

3K, L). Greatest concentration of rods in central stalk of tentacles, especially at base; rods absent from lateral lobes of palps. Length variable; smallest rods $44\ \mu\text{m} \times 4\ \mu\text{m}$, largest $180\ \mu\text{m} \times 22\ \mu\text{m}$. Introvert with scattered layer of small ($13\text{--}31\ \mu\text{m}$) circular to oblong rosettes, with deeply incised, undulating margins (Fig. 3M, N).

In preserved material body wall tan to brown, feet and basal warts white, tentacles beige with light to dark brown mottling.

Intestinal contents mostly unidentifiable amorphous material, but including ostracod, diatom, foraminiferal and sponge remains.

Autoevisceration.—This species is capable of autotomizing its aquapharyngeal bulb, including the introvert, tentacles, calcareous ring and Polian vesicle, and intestine. These structures were present in only 6 of 37 specimens available for study, and 2 of these 6 were in process of autotomy when they were preserved. Gonads, respiratory trees and cloaca were unaffected by the process. One of the partially autotomized individuals was dissected; apparently autotomy begins with separation of the introvert from the anterior body wall, the retractor muscles from the radial longitudinal muscles, and the intestine from the mesenteries and cloaca. The process culminates in expulsion of the bulb and related structures through the anterior end of the holothurian.

Etymology.—The specific epithet is derived from Greek, *tany* = long and *speira* = spire, in reference to the very long spires on the tables supporting the tube feet in this species.

Distribution.—Presently known off Trinidad, Colombia and Honduras, at depths of 51–170 m.

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LITERATURE CITED

- Deichmann, E. 1930. The holothurians of the western part of the Atlantic Ocean. *Bull. Mus. Comp. Zool.* 71(3): 41–226.
- . 1954. The holothurians of the Gulf of Mexico. Pages 381–410 in *Gulf of Mexico, its origin, waters and marine life*. U.S. Fish Wildl. Fish. Bull. 89.
- . 1957. The littoral holothurians of the Bahama Islands. *Am. Mus. Nov.* 1821: 1–20.
- . 1963. Shallow-water holothurians known from Caribbean waters. *Stud. Fau. Curacao* 14(63): 100–118.
- Madsen, F. J. 1941. On *Thyone warbergi* n. sp., a new holothurian from the Skagerrak, with remarks on *T. fusus* (O.F.M.) and other related species. *Goteborgs Vetenskaps—Vitt. Samh. Handl.* 1B 1(6): 1–31.
- Panning, A. 1949. Versuch einer Neuordnung der Familie Cucumariidae (Holothurioidea, Dendrochirota). *Zool. Jahrb.* 78: 404–470.
- Pawson, D. L. and J. E. Miller. 1981. Western Atlantic sea cucumbers of the genus *Thyone*, with description of two new species (Echinodermata: Holothuroidea). *Proc. Biol. Soc. Wash.* 94(2): 391–403.

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